

Technology Life Cycle



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Outline



DoD Life Cycle

NASA Life Cycle

Generic Life Cycle

Technology Readiness Levels

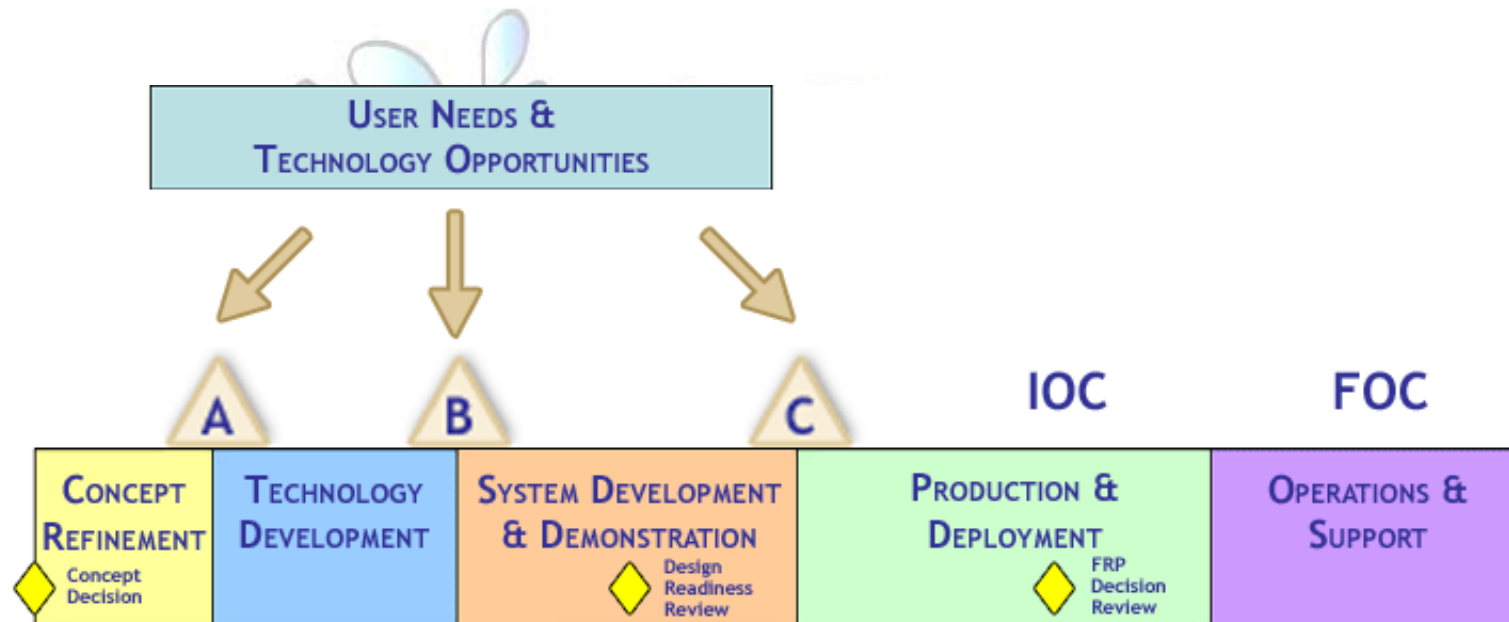
Exceptions

Product Life Cycle

Product and Technology Life Cycles Together



DoD Technology Life Cycle



**DoD Project Life Cycle (DODI 5000.2,
Operation of the Defense Acquisition System)**



NASA Technology Life Cycle



Approval				Launch		
Pre-A Advanced Studies	A Conceptual Design Studies	B Concept Definition/ Initial Baseline	C Design & Develop- ment	D Fabrication & I&T	E Pre- Operations	F Operations/ Disposal

NASA Project Life Cycle

Differences between DoD and NASA project life cycles

Most NASA projects do not enter into multiple item production cycles

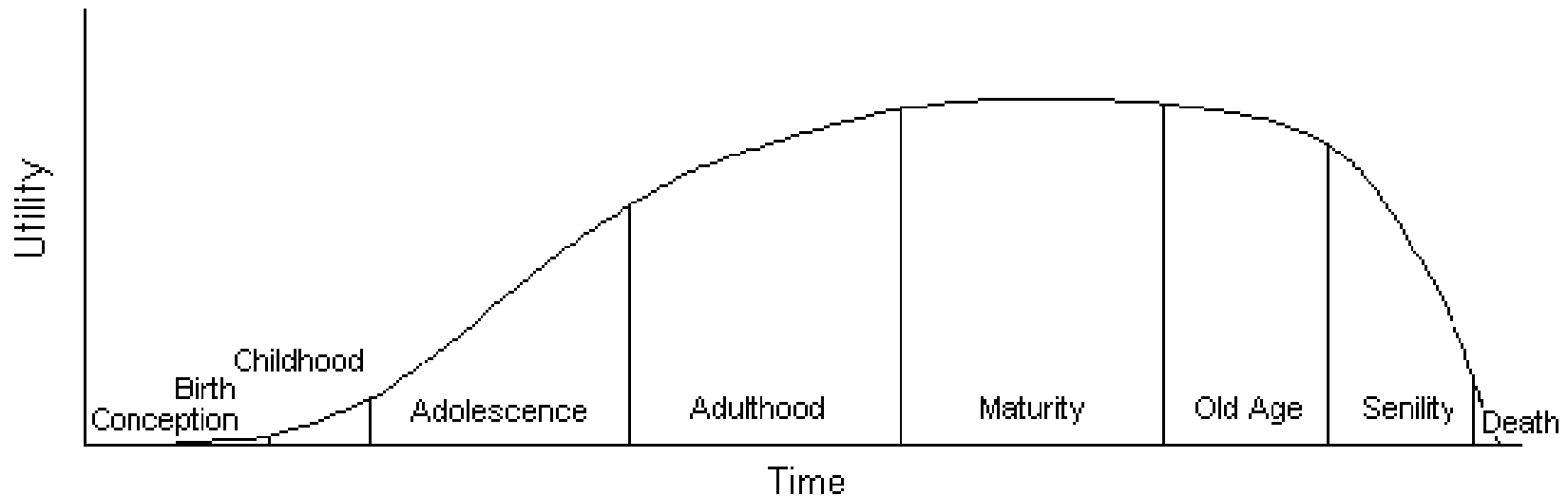
Most NASA projects are not available for retrofitting / repair

Similarities between DoD and NASA project life cycles

Project cost, schedule, and performance risk are most likely significantly reduced if technologies are well developed prior to level / milestone C



Technology Life Cycle



The Whale Chart provides a biological metaphor for the Technology Life Cycle

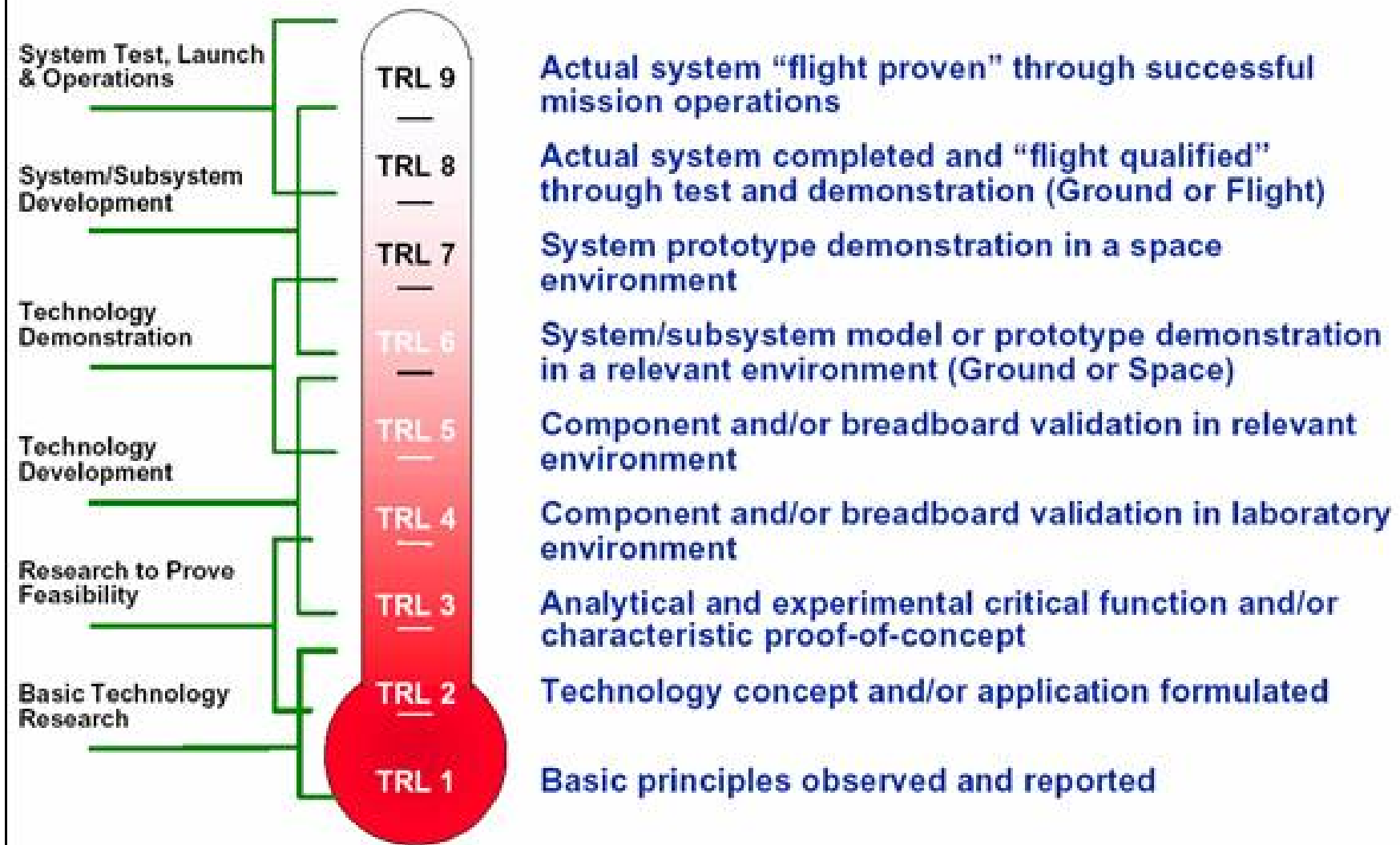
A technology's usefulness changes over time

Utility increases as a technology matures

Utility decreases as a technology becomes obsolete

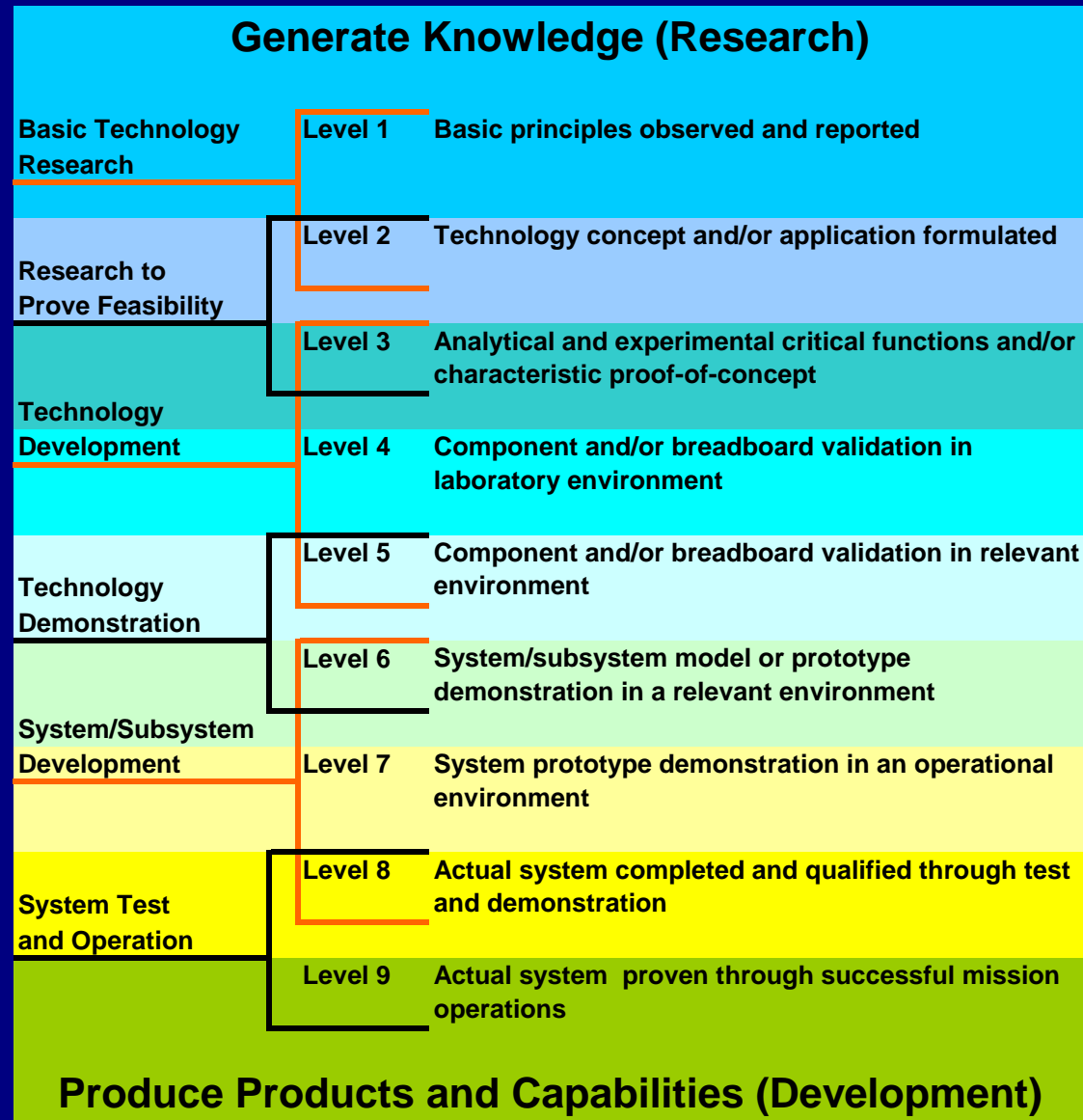


Technology Readiness Levels (TRLs) NASA Definitions



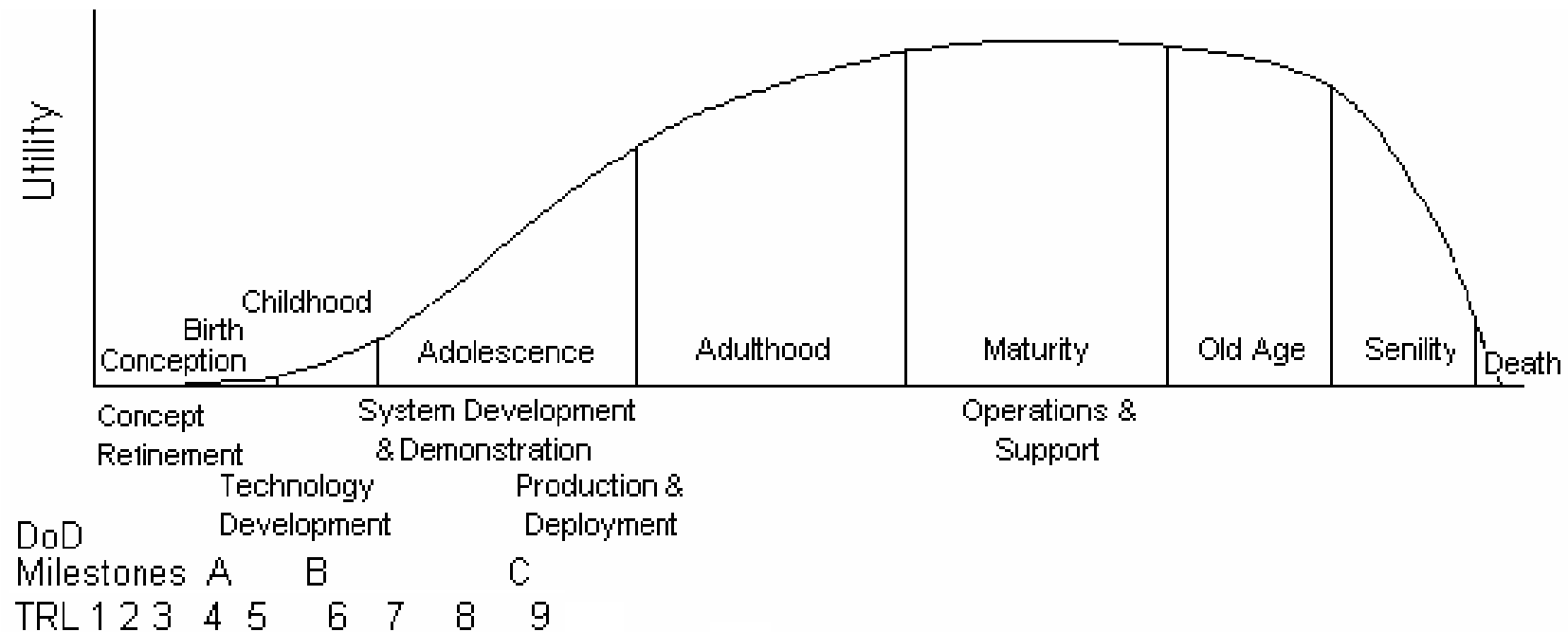


Technology Readiness Levels (TRLs) DoD Definitions





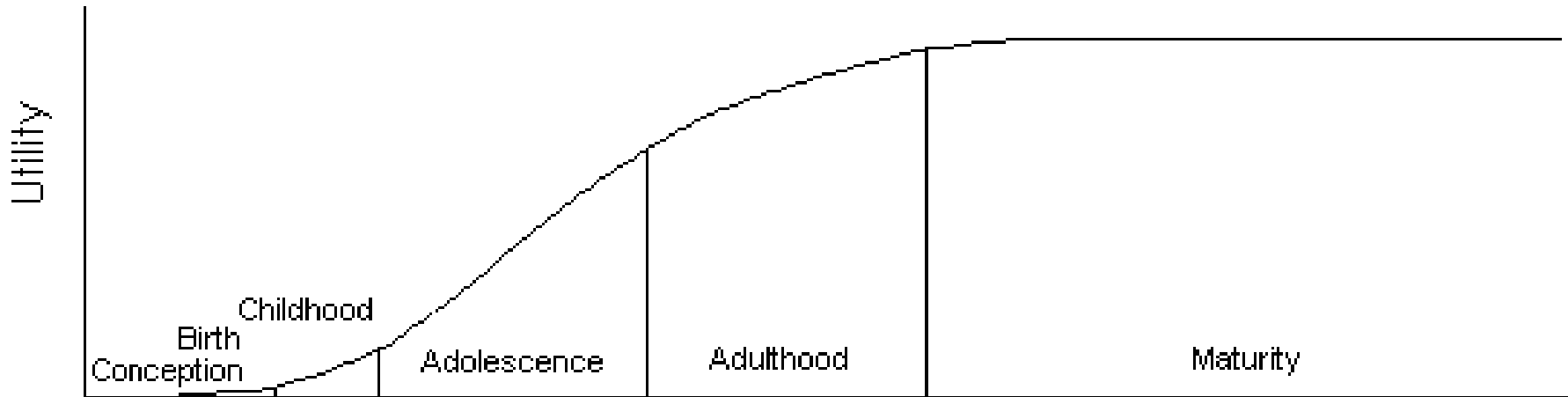
Technology Readiness Levels (TRLs) and Whale Chart



Technology Readiness Levels occur early in the Technology Life Cycle



Technology Life Cycle Exceptions



Basic technologies – Simple machines, etc.

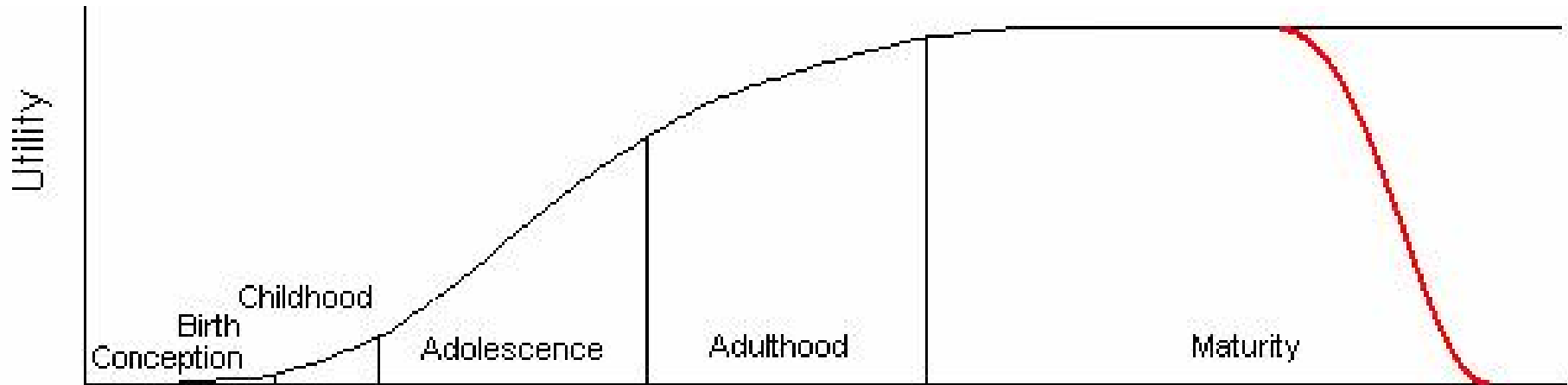
Reached maturity long ago

Utility continues into far future

Probably no competitive advantage can be realized from further work on these technologies



Technology Life Cycle Exceptions



Infrastructure technologies – Electricity, Highways, etc.

Maintain utility because everyone needs them

Presence gives no competitive advantage

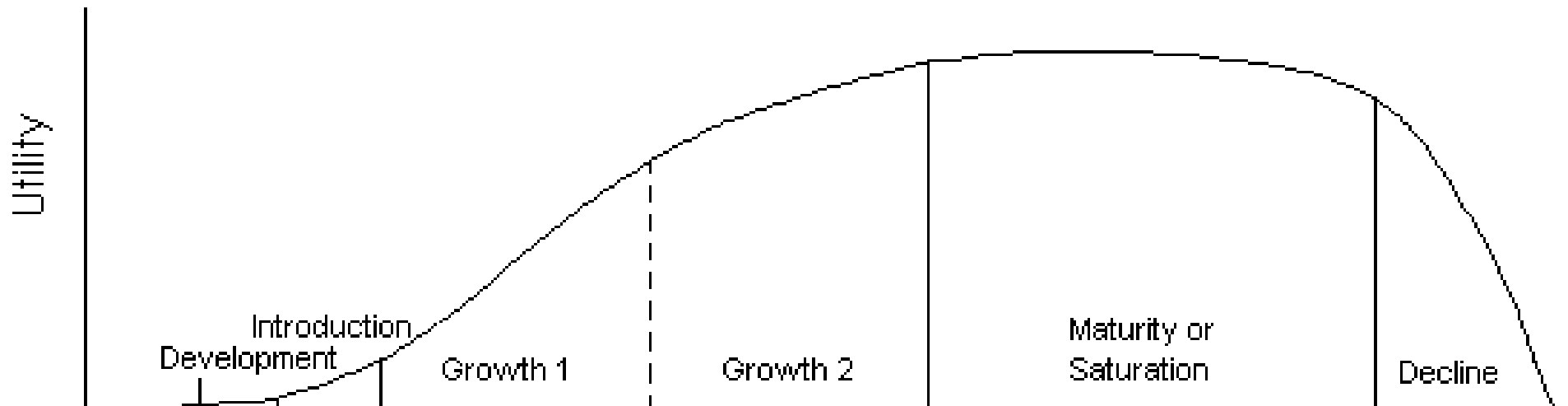
Absence brings disadvantage

May evolve over time

**Disruptive new infrastructure technologies ———
can truncate Maturity Phase with little warning**



Product Life Cycle



The Product Life Cycle is similar in shape to the Technology Life Cycle

Applies to a single product

Usually product development starts with a mature technology



Product and Technology Together



Multiple products often use the same underlying technology

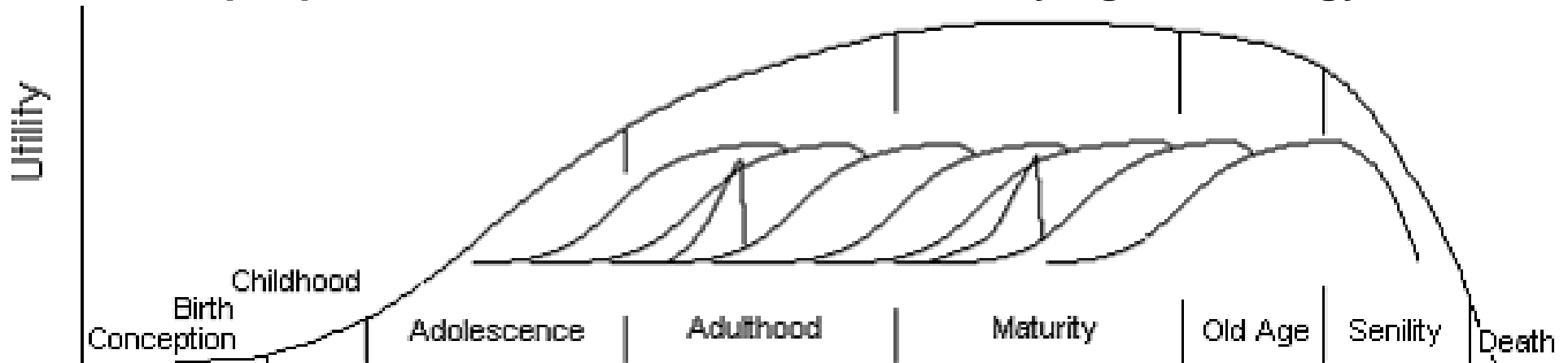


Figure shows many product life cycles embedded in one technology life cycle

Note that first product starts after technology has matured to some extent

The technology survives individual products that use it

Sharply peaked curves represent fad products





Conclusion



- **Technology Maturity Measures Where You Are in the Technology Life Cycle**
- **There Are Several Different Definitions of the Technology Life Cycle**
 - **DoD**
 - **NASA**
 - **Whale Chart**
- **Technology Readiness Level (TRL) Is One Measure of Technology Maturity**
- **Some Technologies Are Exceptions to Life Cycle**
 - **Basic Technologies**
 - **Infrastructure Technologies**
- **Technology and Product Life Cycles Are Different**



That's All!

